

**APPLICABILITY OF THE TOXICITY CHARACTERISTIC  
LEACHING PROCEDURE  
TO MINERAL PROCESSING WASTES**

**Technical Background Document Supporting the  
Supplemental Proposed Rule Applying Phase IV Land  
Disposal Restrictions to Newly Identified Mineral  
Processing Wastes**

**Office of Solid Waste  
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# APPLICABILITY OF THE TOXICITY CHARACTERISTIC LEACHING PROCEDURE TO MINERAL PROCESSING WASTES

## Introduction

On August 6, 1993, the U.S. Court of Appeals for the District of Columbia Circuit (hereafter "the Court") ruled that EPA had failed to provide sufficient justification for the application of the Toxicity Characteristic Leaching Procedure (TCLP) to mineral processing wastes (and manufactured gas plant wastes). The Court remanded the TCLP to the Agency for review and, if necessary, further action. This report provides historical background on the issue of the applicability of the TCLP to mineral processing wastes, summarizes the specific findings of the Court, discusses alternatives to the TCLP, and evaluates the Agency's position in light of readily available information.

## 1.0 History/Background

Section 1004(5) of the Resource Conservation and Recovery Act (RCRA) defines hazardous waste as solid waste that may "pose a substantial present or potential threat to human health and the environment when improperly treated, stored, transported, or otherwise managed." RCRA Section 3001 charged EPA with the responsibility of defining which specific solid wastes would be considered hazardous waste either by *identifying the characteristics* of hazardous waste or listing particular hazardous wastes. In response, the Agency identified four characteristics of hazardous waste: 1) toxicity, 2) corrosivity, 3) reactivity, and 4) ignitability. EPA also developed standardized procedures and criteria for determining whether a waste exhibited one of these characteristics. These characteristics and criteria are codified at 40 CFR Part 261; testing procedures are generally detailed in SW-846.<sup>1</sup>

### 1.1 *Development of the Extraction Procedure*

The Extraction Procedure (EP) was the original test developed by EPA for determining whether a waste was hazardous by virtue of its toxicity. Because RCRA defines a hazardous waste as a waste that presents a threat to human health and the environment when "improperly managed," the Agency developed a set of assumptions that described possible ways in which a waste would be disposed if not subject to Subtitle C controls. The Agency intended this so-called "mismanagement scenario" to simulate a "plausible worst case" of mismanagement. Under this worst case scenario, EPA therefore assumed that potentially hazardous wastes would be co-disposed with municipal solid waste (MSW) in a landfill with actively decomposing material overlying an aquifer. When it developed the mismanagement scenario, the Agency recognized that not all wastes would

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<sup>1</sup> U.S. Environmental Protection Agency, Test Methods for Evaluating Solid Waste, Volumes I and II (SW-846), 3rd Edition, November 1986. Updates are available through Revision 2B, published April 4, 1995.

be managed in this manner. The Agency also believed, however, that one consistent set of assumptions was necessary to ensure adequate implementation of the hazardous waste definition, and that given its mandate to protect human health and the environment, it was justified in taking a fairly conservative approach to developing the scenario.

The EP itself was developed specifically based on the assumptions regarding mismanagement described above. Assuming that potentially hazardous waste could be disposed in a landfill containing actively decomposing municipal waste, the Agency reasoned that the most likely pathway for human exposure to toxic constituents would be through drinking water contaminated by leachate from the landfill. Thus, the EP defined the toxicity of a waste by measuring the potential for the toxic constituents present in the waste to leach out and contaminate groundwater and surface water (and by extension, drinking water sources) at levels of health or environmental concern.

Specifically, the EP required analyzing a liquid waste or liquid waste extract to determine whether it contained unacceptably high concentrations of any of 14 toxic constituents identified in the National Interim Primary Drinking Water Standards (NIPDWS). Consistent with the mismanagement scenario, the liquid extract is obtained from solid waste (following particle size reduction, if necessary) by exposing the waste to organic acids (the acids likely to be found in a landfill containing decomposing municipal wastes). NIPDWS were selected because at the time that the EP was promulgated, they were the only health-based regulatory standards available. To account for the likely dilution and attenuation of the toxic constituents that would occur as they traveled from the landfill to a drinking water source, the Agency multiplied the NIPDWS by a "dilution and attenuation factor" (DAF) of 100. The DAF of 100 was not derived from any model or empirical data, but rather was an estimated factor that the Agency believed would indicate substantial hazard.

## *1.2 HSWA and the Development of the Toxicity Characteristic Leaching Procedure*

In the Hazardous and Solid Waste Amendments of 1984 (HSWA), Congress directed EPA to expand the toxicity characteristic (TC) and reevaluate its use of the EP to determine whether wastes exhibited a toxic characteristic. Congress mandated the reevaluation out of a concern that the EP inadequately represented the mobility of toxicants under a wide variety of conditions. Specifically, Congress was concerned that the leaching medium used in conducting the EP was not sufficiently aggressive to adequately identify hazardous wastes, and that the EP evaluated the mobility only of elemental (metallic) constituents and not organic toxicants. Congress was particularly concerned that the EP would fail to identify wastes as hazardous when they contained toxic levels of organic compounds.

In response to this Congressional mandate, EPA developed, in 1986, a new test -- the Toxicity Characteristic Leaching Procedure (TCLP). Given Congressional concerns, EPA's primary focus in developing the TCLP was to satisfy two objectives: 1) to create a test that would generate replicable results for organics, and 2) to create a test that would yield the same results for inorganics as the original EP test. Accordingly, at the same time that it promulgated the TCLP, the Agency also expanded the list of contaminants for which the test was to be conducted by adding 25 organic compounds. Selection of new constituents was based on the availability of chronic toxicity reference levels. Using a subsurface fate and transport model, the Agency also confirmed the adequacy of DAFs of 100 for all of the listed toxic constituents.

The TCLP begins with the same mismanagement assumptions that formed the basis for the development of the EP -- that wastes would be co-disposed with actively decomposing MSW in a landfill. Thus, the test is designed to determine the mobility of toxic constituents in wastes when exposed to organic acids. After particle size reduction, a liquid extract is obtained from solid waste by exposing the waste to a leaching medium (also referred to as an extraction fluid). In contrast to the EP, which specified only one leaching medium, the TCLP allows the use of two media. The specific medium used is determined by the alkalinity of the solid waste. The extract is then analyzed for the presence of any of the 39 listed toxic constituents at concentrations high enough to be of concern. (Details concerning TCLP procedures may be found in 40 CFR Part 261, Appendix II or in EPA's publication, Test Methods for Evaluating Solid Waste, SW-486.) The primary difference between the EP and the TCLP is that the TCLP encompasses a broader range of constituents and more accurately addresses the leaching potential of wastes containing organic constituents.

When it proposed the expanded TC constituent list and the TCLP (51 FR 21655), the Agency requested comment on the applicability of the mismanagement scenario to different waste streams. A number of commenters challenged the applicability of the mismanagement scenario to mineral processing wastes. They argued that it was unreasonable to assume that mineral processing wastes would be co-disposed with municipal solid wastes, stating that the large volume and other special properties of mineral processing wastes prohibited their disposal in small municipal landfills that lacked the capacity to manage these wastes. The commenters recommended that separate characteristics be developed for these wastes, using a more appropriate mismanagement scenario. The Agency, however, disagreed with them, stating in the preamble to the final rule that

"the mismanagement scenario is [not] unreasonable for either non-exempt mineral processing wastes or municipal combustion ash. Although large volume wastes from the extraction, beneficiation, and processing of ores and minerals are currently exempt from Subtitle C regulation and will not be affected by the TC rule, small volume mineral processing wastes which may

be subject to Subtitle C regulation can plausibly be disposed in municipal landfills." (55 FR 11807)

The TCLP and other changes to the TC regulations were finalized in March, 1990 (55 FR 11798).

### 1.3 *Court Decision Remanding the TC*

In 1988, Edison Electric Institute, joined by the American Mining Congress (now the National Mining Association (NMA)) and several other petitioners, brought suit against EPA, challenging the validity of the TC with regard to mineral processing wastes and electric utility wastes. Specifically, the petitioners argued<sup>2</sup> that the mismanagement scenario that forms the basis for the TCLP does not apply to these wastes for the following reasons:

- Mineral processing wastes are produced in such vast quantities that the majority of MSW landfills could not possibly handle them. In support of this argument, petitioners cited EPA's 1988 Report to Congress (RTC) on Solid Waste Disposal in the United States. The RTC indicates that 67 percent of all MSWLFs handle less than 8,000 tons of waste per year (tpy). Because mineral processing wastes may be produced at quantities greater than 8,000 tpy per facility, the petitioners maintained that disposal of these wastes in most MSWLFs would completely overwhelm their capacity.
- Mineral processing wastes are typically generated at facilities with substantial on-site landfill capacity. These same facilities, argue the petitioners, are generally located in remote regions of the West, not located near a MSWLF with enough capacity to handle these large quantity wastes. As a consequence, the wastes are unlikely to be managed off-site in an MSWLF. AMC cited the May 15, 1979 comments of the St. Joe Mineral Corporation, which stated that it would be inconceivable for a generator of hundreds or thousands tons of waste per day to deposit this waste in an MSWLF for several reasons, including exorbitant transportation costs.
- Finally, for at least some wastes, disposal in MSWLFs is also unlikely given the potential to remine the wastes to extract additional valuable minerals.

In addition, the petitioners argued that the inapplicability of the mismanagement scenario to mineral processing wastes made the TCLP too severe in predicting the

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<sup>2</sup> Brief for Petitioner, *Edison Electric Institute et al. v. U.S. EPA*, Petition for Review of Final Agency Action by the U.S. EPA, (June 5, 1992).

hazardousness of mineral processing wastes. The petitioners cited the following in support of their argument:

- The TCLP's acetic acid leaching medium is too aggressive for use in determining the toxicity of mineral processing wastes. The TCLP's leaching medium was designed to recreate the organic acid-leachate produced by the decomposition of putrescible wastes in a MSWLF. The petitioners asserted, however, that mineral processing wastes are typically disposed of in monofills that are neutral or alkaline in nature. The petitioners further asserted that in those instances in which mineral processing wastes are managed in an acidic environment, the acids present tend to be inorganic and less aggressive than organic acids found in MSWLFs. Thus, it is inappropriate to subject mineral processing wastes to an organic acid leachate test to determine toxicity.
- The particle size reduction requirement of the TCLP does not reflect conditions in which mineral processing wastes are generally managed. Monolithic mineral processing wastes are massive, rock-like structures whose form serves to minimize leaching. These wastes, therefore, will not break down when exposed to the physical forces found in MSWLFs. In addition, the petitioners maintained, most mineral processing facilities are located in the remote, arid west: these wastes, therefore, will not be subjected to freeze-thaw and wet-dry cycles that may cause them to break down. Further, processing wastes do not require a layer of daily cover as organic waste does. This would reduce the compression resulting from the use of heavy machinery. The particle size requirement, they argue, does not mimic the real-world situation because it would maximize leaching in the laboratory by increasing the surface area of the waste.
- The application of the MSWLF scenario to mineral processing wastes does not accurately reflect the potential hazards posed by these wastes. Part of this argument rests on the degree of dilution and attenuation that will occur between mineral processing facilities and drinking water wells. The petitioners disputed the assumption that "drinking water wells were situated 500 feet down gradient from the [MSWLF] site," (45 FR 33111) on which EPA based its determination of a DAF of 100, arguing that the 500 foot assumption is particularly unrealistic for mineral processing wastes. The petitioners again asserted that mineral processing facilities are typically located in remote areas of the West where the distance to the nearest drinking water wells is often substantial. This distance between the landfills and wells would therefore result in a greater dilution and attenuation factor than EPA allows for in the TCLP.



- Finally, the Agency itself, in other contexts, had stated that a less aggressive leaching test (Method 1312, the Synthetic Precipitation Leaching Procedure or SPLP) is the proper test to apply to such wastes. The petitioners cited the following statement, made in the preamble to the final rule addressing the scope of the federal Mining Waste Exclusion, in support of their argument:

In contrast to the disposal of municipal refuse, mineral processing wastes are unlikely to be managed in environments that contain or are capable of generating organic acids, such as the acetic acid formed by decaying garbage; mineral processing wastes, with very few exceptions, do not contain appreciable quantities of organic matter. Thus, EPA believes that use of the EP or TCLP would identify certain mineral processing wastes as not low hazard which EPA believes are appropriate for further study [to determine whether they qualify for exclusion].<sup>3</sup>

In response to the petitioner's arguments in *Edison*, the Agency argued that it established a single toxicity test based on reasonable assumptions regarding how industrial wastes might plausibly be mismanaged in the absence of Subtitle C controls, and that statutory mandates to revise the TC did not direct EPA to develop "management-based" approaches that would tailor toxicity tests to the specific conditions to which any type of industrial waste, including mineral processing waste, might be exposed. The Agency further argued that such multiple approaches would generate complex enforcement problems due to the difficulty of determining how any given waste will be managed. EPA also argued that the MSWLF mismanagement scenario represents a plausible worst case mismanagement scenario because contamination of ground water and surface water through the leaching of land-disposed wastes is a prevalent and well-documented environmental hazard. While conceding that the mismanagement scenario resulted in the application of more aggressive leaching media than other scenarios, the Agency contended that this conservative approach was warranted given EPA's statutory mandate to protect human health and the environment.

In a decision handed down on August 6, 1993, the Court decided in favor of the petitioners. While ruling that EPA was justified in developing one generic procedure for determining whether a waste is hazardous by virtue of toxicity, the Court found that the

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<sup>3</sup> 54 FR 36601, September 1, 1989.

Agency had failed to adequately demonstrate *in the record* the applicability of the TCLP to mineral processing wastes. The Court's decision outlined the following deficiencies:

- The Agency failed to demonstrate the relationship of the TCLP to mineral processing wastes;
- The evidence included in the record did not demonstrate that low volume mineral processing wastes had been disposed in MSWLFs in the past; and
- There was no evidence in the record that mineral processing wastes could come into contact with an acidic leaching medium.

Based on these findings, the Court remanded the TC rule as it applies to mineral processing wastes to the Agency to allow it to provide "a fuller and more reasoned explanation for its decision to apply the TCLP to mineral processing wastes." The Court specifically did not conclude that the mismanagement scenario was inapplicable to mineral processing wastes. Instead, the Court found only that the Agency needed to provide a factual basis for applying the scenario to mineral processing wastes. Consequently, the Agency can prove that co-disposal of mineral processing wastes with MSW is a *plausible* mismanagement scenario (not necessarily typical or common), then it is justified in applying the TCLP to such wastes. The Agency believes that the existing evidence makes this case. This evidence is presented in Section 2.0 below.

#### 1.4 *Additional Comments*

While it did not specifically support use of the SPLP in its brief to the Court, AMC, in a later comment specifically recommended that the Agency adopt the SPLP for determining the toxicity of mineral processing wastes. Responding to the Agency's request for comment on the applicability of the SPLP to mineral processing wastes, AMC argued in favor of using the SPLP to evaluate mineral processing wastes and again pointed to Agency statements suggesting that the TCLP might not be appropriate for these wastes. In its July 24, 1992 comments on the Hazardous Waste Management System; Identification and Listing of Hazardous Waste (May 20, 1992) proposed rule, in which EPA asked for comment, AMC stated:

"... at least in theory, Method 1312 should more closely approximate actual disposal conditions for the many wastes and media that are not exposed to organic acids as assumed under the TCLP."

AMC asserted that the less aggressive leaching medium used in the SPLP made it a more appropriate test than the TCLP for identifying hazardous mineral processing wastes.

## 2.0 Agency Response to Court Directives and Other Industry Comments

As ordered by the Court in *Edison Electric Institute v. U.S. EPA* (hereafter *Edison*), the Agency has developed additional material, for the record, demonstrating that mineral processing wastes may plausibly be mismanaged in a manner similar to that described in the Agency's mismanagement scenario. The Agency's expanded rationale considers the following factors:

- (1) The basis for the Agency's conservative approach;
- (2) Past incidents of co-disposal of mineral processing wastes with MSW; and
- (3) The location of mineral processing facilities relative to population centers and sensitive environments.

Each of these is discussed below. In addition, the Agency addresses AMC's more recent suggestion that the SPLP be used as an alternative to the TCLP to determine the toxicity of mineral processing wastes.

### 2.1 Co-disposal

In the *Edison* case, the mineral processing industry argued that the TCLP did not adequately measure the potential toxicity of mineral processing wastes because it was based on a mismanagement scenario that assumed that wastes would be co-disposed with municipal solid waste. Industry argued that a different mismanagement scenario should therefore be applied to these wastes. The Agency does not, however, agree that waste management practices in the mineral processing industry are so uniform or so different from other industrial waste disposal practices that a separate mismanagement scenario for mineral processing wastes would be justified.

While the Agency recognizes that mineral processing wastes may be generated in large volumes and managed in monofills at the mineral processing facility, the Agency does not believe that such wastes are exclusively managed in monofills or on site. In particular, the Agency disagrees with the mineral processing industry's claim that all mineral processing wastes are generated in large volumes, and that therefore the wastes cannot be co-disposed in a MSWLF. Large volume wastes, of which there are only twenty, are not subject to Subtitle C requirements. By definition, facility-level mineral processing waste generation rates above 45,000 metric tons per year and which have been deemed low toxicity, are exempt under the Bevill Amendment. Wastes generated in such large quantities are likely to be disposed of in monofills. Wastes generated at rates below this level may plausibly be co-disposed (on- or off-site) with other (possibly municipal) wastes. Some examples of mineral processing wastes generated below the high volume criterion can be found in Table 1 below.

The Agency believes that wastes generated in the volumes cited below might plausibly be disposed in MSWLFs. Even if most MSWLFs receive less than 8,000 tons per year as suggested by AMC in its *Edison* brief, there is clearly sufficient capacity in those landfills to manage some of the wastes cited below. In fact, since the Agency's 1988 Report to Congress on Solid Waste Disposal, MSWLF size has increased. As a result of promulgation of federal criteria for MSWLFs, many small landfills have closed. Today, MSWLFs are likely to be larger than those cited by AMC. According to BioCycle, a publication specializing in solid waste issues, "while the nation appears to have plenty of disposal capacity, it is becoming concentrated in larger landfills. . ."<sup>4</sup> In addition, the Agency does not believe that all the waste generated at a mineral processing site would necessarily be disposed exclusively in an MSWLF or a monofill. Specifically the Agency believes that mineral processing wastes generated at a particular site may be managed both on-site in a monofill, as argued by NMA, and off-site in an MSWLF. Thus, it is plausible that some waste might be shipped to an MSWLF, while the remaining waste is kept on-site.

<b>Table 1. Low Quantity Generation of Mineral Processing Wastes<sup>5</sup></b>	
<b>Waste</b>	<b>Total Annual Industry Generation Rate (mt/yr)</b>
Tantalum, columbium, and ferrocolumbium raffinate solid	2,000
Baghouse incinerator ash from lead production	3,000
Zinc-lean slag	17,000
Metal chloride residues from bismuth production	3,000
Spent furnace brick from lead production	1,000
Slurried APC dust from lead production	7,000

Source: EPA, 1995

<sup>4</sup> "The State of Garbage in America," *BioCycle*, p. 46, April 1994.

<sup>5</sup> U.S. Environmental Protection Agency, Office of Solid Waste, *Identification and Description of Mineral Processing Sectors and Waste Streams*, October 24, 1995, pp. 11-25.

The Agency also has evidence that mineral processing wastes have, in fact, been mismanaged and co-disposed with other wastes in MSWLFs. The Agency gathered this evidence through a variety of means, including an electronic literature search, via LEXIS, of journal articles (e.g., the Engineering and Mining Journal) and descriptions of NPL sites. In addition, the Agency reviewed responses from the 1989 National Survey of Solid Wastes from Mineral Processing to locate information suggesting potential cases of co-disposal. As part of the Survey, respondents were asked to describe their on-site disposal areas and the types of wastes disposed in them. Information on co-disposal was also gathered based on descriptions of state enforcement actions taken against companies with suspect waste management practices.

This research yielded a number of examples of co-disposal and potential co-disposal. These examples have been categorized according to the level of evidence pointing to co-disposal. Category 1 includes clear-cut cases of co-disposal of mineral processing and other wastes. Category 2 cases consist of instances of possible co-disposal. Category 3 includes cases where the potential for co-disposal exists or existed, either on- or off-site. Examples of each category are included below.<sup>6</sup>

### 2.1.1 Category 1: Likely Cases of Co-disposal

The following cases of co-disposal provide plausible evidence that mineral processing wastes may be co-disposed with MSW and that the mismanagement scenario underlying the TCLP may therefore be applied to mineral processing wastes. Evidence of such cases, herein referred to as Category 1 cases, is based on information from state enforcement records and literature searches. These cases are described briefly below. Details concerning these cases are provided in Appendix A.

- Brown Metallurgical/Powers Refining (Arizona, 1994). Brown Metallurgical/Powers Refining conducts research into methodologies for the reclamation of metals from aluminum dross, printed circuit boards, and other metal-bearing wastes. These activities generate a variety of wastes, including processed mineral waste, liquid wastes, and chemical wastes. Given the size and nature of the laboratory and its activities, these wastes were generated in relatively small volumes.

A complainant reported seeing a dumpster filled with unknown wastes taken by dump truck to a Cal-Mat Landfill. This information led state officials to make an inspection of the facility. The inspection resulted in the Arizona Department of Environmental Quality issuing a Notice of Violation to Brown Metallurgical Lab. This notice detailed numerous violations, including the dumping of unknown wastes in

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<sup>6</sup> Complete descriptions of the examples presented can be found in the Appendices A-C of this Background Document.

the Cal-Mat landfill and the presence of numerous drums and buckets of unknown wastes throughout the facility.

- A&W Smelters and Refiners (California, 1991). A&W Smelters and Refiners (A&W), a company specializing in gold and silver refining, operated a mine and smelter in California for 25 years. The facility was located on land owned by the Department of the Interior and supervised by the Bureau of Land Management (BLM). As a result of disputes with BLM over operations, A&W was forced to close its facility. As part of the closure process, A&W processed or sold piles of ore and slag that had accumulated on the site, tore down buildings and burners, and removed concrete. Most of the slag was exported to Taiwan for reuse; a lead tailings pile was shipped to a facility in Arizona for smelting, and additional lead dross was shipped to a facility in Idaho for resmelting.

A final ore pile remained on site. This pile consisted of about 345 tons of material, composed of 86 percent ore and 14 percent slag. The material was being held at the site pending sale for remining. If the pile could not be sold, it was to be shipped to an off-site Subtitle C facility for disposal.

In December of 1991, a truck picked up and transported a pile of concrete and demolition debris for disposal to the Mojave County Landfill. In the course of removing the concrete and debris, the transporter also removed a portion of the remaining ore pile. Operators at the local landfill recognized part of the waste shipment brought by the truck as mining waste and prevented further disposal of the material in the landfill. After investigations by local officials, the ore and slag were ordered to be removed from the landfill and returned to A&W. Several months later, A&W sold the ore pile to a mineral processing company in Mexico. The Mexican government seized one of A&W's shipments to the Mexican company, and shortly thereafter, U.S. EPA determined, based on application of the TCLP, that the ore was hazardous by reason of its toxicity.

- Osborne Landfill (Pennsylvania, 1950-1978). This landfill, located on an abandoned strip mine, operated from the 1950s to 1978. The State closed the facility in that year for accepting industrial wastes without a permit. These wastes included an unspecified slag.

### 2.1.2 Category 2: Possible Cases of Co-disposal

Category 2 cases provide examples of possible co-disposal of mineral processing wastes with other wastes. These examples include the disposal of materials such as "slag," "dusts," and "ash" in various landfills. Established regulatory terms such as "beneficiation," "exempt and non-exempt mineral processing," and "primary and secondary mineral wastes," are absent from descriptions of such disposal practices. The

absence of precise language, coupled with the fact that these wastes often become indistinguishable from the soil and debris in municipal landfills, makes it difficult to determine if co-disposal occurred. While there is some uncertainty as to the origin of such wastes, there is at least a significant possibility that they are non-exempt wastes from mineral processing facilities, and EPA believes that this information should be considered in conjunction with the other evidence of known co-disposal in assessing the plausibility of exposure to landfill or landfill-like conditions. The cases described below provide further information on these examples of co-disposal. Additional details concerning these cases are provided in Appendix B.

- Trona, Argus, and Westend Searles Dry Lake Mining Facilities (California, 1992). Piles of mineral materials are located at sites historically used for community trash and general plant debris. Rusted cans, broken bottles, and paper have been recovered along the edges of the piles.
- Nedlog Technology Group (Wyoming, 1981). Flue dust from copper and lead smelters was to be detoxified and sent to ordinary landfills. The efficiency of the detoxification process to remove all metal constituents is not known by the Agency.
- Phosphate Mining Wastes (1981). Agglomerates from the dewatering of slimes from the mining and beneficiation of phosphate rock were disposed of as landfill.
- Freeway Sanitary Landfill (Minnesota, 1971-1984). This MSWLF accepted aluminum sweat furnace slag in addition to numerous liquid and hazardous wastes.
- J&L Landfill (Michigan, 1951-1980). Emission control dusts and alkaline slag were buried at the landfill at depths up to 25 feet. This landfill is also known as the Avon Township Landfill, which would suggest that it accepted MSW.
- Dixie Caverns County Landfill (Virginia, 1965-1976). This unlicensed landfill accepted both MSW and fly ash.
- Ohio River Park (Pennsylvania, 1930-1965). This site served as a MSWLF until the mid-1950s, when it was converted into a disposal site for industrial wastes, including slag.
- U.S. Department of Energy Feed Materials Production Center (Ohio, 1989). Fly ash and low-level radioactive and mixed hazardous wastes were disposed of at various sites, including a sanitary landfill.
- Janesville Disposal Facilities (Wisconsin, 1983). Fly ash and dried sludges have been sent to landfills since 1974.

- Corpus Christi Zinc Plant (Texas, 1981). Underflow from the reactor clarifier was thickened to produce a solid waste which was eventually sent to a landfill. Gypsum hydroxide cake, produced at the neutralization plant, was sent to a registered landfill.
- Centralia Municipal Landfill (Washington, 1958-1992). This landfill accepted a combination of municipal and industrial wastes, including sulfur wastes.

### 2.1.3 Category 3: Potential Cases of Co-disposal

Numerous other examples exist where co-disposal could have occurred. Typically, such cases involve mineral processing and municipal solid wastes being disposed of in close proximity to each other (e.g., in two separate on-site disposal areas). While these historical examples do not demonstrate co-disposal, the potential for co-disposal in such situations is real. Examples of such potential cases of co-disposal include instances in which ash and other mining wastes were used as landfill cover, as in Lemberger Landfill, Inc. in Wisconsin and Buckeye Reclamation in Ohio. Co-disposal may have also occurred at sites where landfills were developed on land previously used for mining activities. For example, the Jackson Township Landfill in New Jersey and the Heleva Landfill in Pennsylvania were developed above former titanium and iron ore pits, respectively. Additional details concerning these cases are provided in Appendix C.

In addition to the above cases, the Agency has evidence that mineral processing wastes have been co-disposed with plant trash and other miscellaneous solid waste in on-site landfills. Analysis of data submitted by mineral processing facilities in response to the Agency's 1989 National Survey of Solid Wastes from Mineral Processing Facilities reveals several cases in which survey respondents reported disposing mineral processing wastes with other solid wastes in landfills or other land-based units. These cases are summarized in Table 2.

### 2.1.4 Co-disposal of Manufactured Gas Plant Wastes

In late nineteenth and early twentieth century America, manufactured gas (or town gas) provided energy for lighting, cooking, and heating purposes. Town gas was manufactured at 1,000 to 1,500 plants throughout the United States. Manufactured gas typically took one of five forms: (1) blue gas, (2) carbureted water gas, (3) coke oven gas, (4) catalytically cracked gas, and (5) oil gas. The gas production process began in a distillation phase during which coal, coke, or oil was heated to drive off volatile organic carbon-based materials. This manufactured gas was then condensed to remove tars. Finally, the gas was purified to remove other contaminants and toxic materials.

Wastes were generated by each of these processes. Wastes included tar and oil residues and sludges, spent oxides, and ash materials. Such materials contain



polynuclear aromatic hydrocarbons (PAHs), benzene, ethyl benzene, toluene and xylenes (BETXs), cyanide, and ammonia liquor. EPA lists many of these constituents as carcinogenic or priority pollutants. By the early 1900s, tar by-products were marketed as a wood preservative. Other wastes (and tars produced in the late 1800s) were disposed both on- and off-site.

<b>Table 2. Potential On-Site Co-Disposal Cases</b>			
<b>Facility Name</b>	<b>Location</b>	<b>Unit Type</b>	<b>Wastes Disposed</b>
Agrico Chemical Company - South Pierce	Mulberry, FL	Landfill	98% plant trash, 2% spent catalyst
Allied Signal, Inc.	Geismar, LA	Fluorogypsum Stack	Fluorogypsum, rainfall, process wastewater, effluent liming sludge, miscellaneous wastes, pondwater recycle
Bethlehem Steel Corp. - Structural Products Division	Bethlehem, PA	Landfill	BOF reladle baghouse dust, BOF precipitator fume & dust, BOF slag fines, BF baghouse dust, coke plant refuse, repair facilities refuse, railroad refuse (PB & NE), general plant waste
Great Plains Gasification Project	Beulah, ND	Solid waste disposal	Ash, incinerator scale, AD-8116 pond solids, Pond No. 2 solids, plant trash, DAF sludge, sulfur
Granite City Division of National Steel Corp.	Granite City, IL	Landfills 1 and 2	40% air pollution control dusts and sludges, 60% general refuse/plant clean-up
Granite City Division of National Steel Corp.	Granite City, IL	Landfill 3	BOF dust, flue dust pond (FDP), BF flue dustcatcher, general plant refuse
Nu-West Industries	Soda Springs, ID	Landfill	60% plant trash, 25% earth fill, 5% non-metallic pipe, 2% polypropylene filter bags, 8% gypsum scale removed from processing vessels
RMI Company - Metals Reduction Plant	Ashtabula, OH	Landfill	90% plant trash, 10% mercury contaminated soil
Stouffer Chemical Company - Silver Bow Plant	Silver Bow, MT	Landfill	10% plant trash, 20% phosphorous contaminated scrap iron and steel, 50% electric furnace precipitator dust, 20% phosphorous sludge
Conserv, Inc.	Nichols, FL	Phosphogypsum stack	Phosphogypsum, recycled process wastewater, used filter media, various construction/demolition materials, spent anion/cation resin, waste elemental sulfur, waste grains (specifics on these grains were unavailable)

Source: Company responses to the National Survey of Solid Wastes from Mineral Processing Facilities, 1989.

These wastes remain at abandoned manufactured gas plant sites and in landfills across the country. A number of sites on EPA's National Priorities List (NPL) contain wastes from manufactured gas plants. In addition, coal tar wastes have been included in descriptions of the waste-in-place at landfills throughout the United States. Such cases present possibilities for co-disposal. One example concerns the Mill Creek Dump in Erie, Pennsylvania, which contained both coal tars and garbage.

Appendix D contains lists of landfills that accepted coal tar waste, along with a partial list of NPL sites containing manufactured gas plant wastes. In addition, this appendix includes a list of manufactured gas sites throughout the United States and their CERCLA status as of 1988.

### 2.1.5 Summary and Implications

The above evidence indicates that mineral processing wastes have been co-disposed with MSW (both on site and off site) in the past and in some cases as recently as 1994. Additional evidence gives further support to the argument that mineral processing wastes may plausibly be co-disposed with MSW. It is also clear that such co-disposal has not only occurred in arid regions, but also in areas with a high level of precipitation on the East Coast (e.g., Florida, Virginia). Many of the sites discussed above were placed on the NPL because of the contamination threat they posed to groundwater (through leachate migration), surface water (through run-off), and the surrounding soil. Many sites also had residential areas in their vicinity, thereby presenting human health risks.

EPA does not dispute the fact that acetic acid may be more aggressive than the leachates found in mineral processing waste monofills. Based on the evidence shown above, however, EPA does not believe AMC's contention that mineral processing wastes are solely disposed of in on-site or industrial landfills. Co-disposal of mineral processing and municipal solid wastes in an MSW landfill would support the need to test mineral processing wastes using the acetic acid leaching medium.

EPA's responsibility is to be concerned about potential worst case scenarios and to design regulations that prevent such situations. Given that mineral processing wastes have been co-disposed with MSW in the past, often resulting in threats to the environment, there is reason to believe that such mismanagement could occur again in the future, and that the Agency is justified in applying the TCLP to these wastes to determine whether they are hazardous and thus appropriately subject to Subtitle C requirements.

### *2.2 Location Issues*

The Agency disagrees with the mining and mineral processing industry's contention that mineral processing wastes are disposed exclusively in locations that suggest the

inapplicability of the TCLP to these wastes. Specifically, the Agency does not believe that these wastes are disposed in units that are far from population centers, are not subject to wet/dry cycles that could break up the waste into smaller particles, or are located in areas in which the climatic and geologic characteristics will minimize the leaching potential of these wastes. The Agency's specific arguments and supporting data are discussed in turn below.

2.2.1 Location with regard to population centers. The Agency does not agree with the mineral processing industry that mineral processing facilities are, as a rule, located far from populated areas. In fact, the Agency has ample evidence that many mineral production facilities are located near population centers and, consequently, near drinking water supplies. Analysis of information contained in the Agency's Identification and Description of Mineral Processing Sectors and Waste Streams, Appendices F and G, October 24, 1995, reveals that a significant number of mineral processing facilities (i.e., facilities conducting activities that are not limited to extraction and/or beneficiation) are located near substantially populated areas. Table 3 (below) summarizes the exact location of 13 mineral processing facilities, their sector, and populations located within 0.5, 1, and 5 miles of the facility. The table reveals that, for example:

- 21,450 people live within a half-mile of these 13 facilities, and 85,900 live within a mile; and
- Five of the thirteen facilities are five miles from population centers of over 100,000. Four of those five population centers have populations greater than 200,000.

In addition, a number of facilities are located in such densely populated urban areas as Providence, Rhode Island; Camden, New Jersey; Pittsburgh, Pennsylvania; Louisville, Kentucky; Cincinnati, Ohio; and El Paso, Texas. Thus, contamination from improperly disposed waste at these sites could affect significant numbers of people. EPA also examined the incidents of spills and releases of contaminants from mining operations and the locations where these incidents occurred.<sup>7</sup> The proximity of these sites to larger populations and the frequency of the releases also make it possible that mineral processing wastes could be co-disposed with municipal solid waste. (Specific cases of co-disposal are discussed above). In addition, the Agency notes that the figures presented above may, in fact, understate the proximity of facilities to population centers

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<sup>7</sup> U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, Profile of the Metal Mining Industry, 1995. This information is based on reports prepared for the U.S. Environmental Protection Agency, Office of Solid Waste that deal with mining waste releases and their environmental effects in the states of California, Nevada, South Carolina, New Mexico, Montana, Colorado, Arizona, and Idaho. One such report is entitled, Mining Waste Releases and Environmental Effect Summaries for the State of Colorado, March, 1994.

because in this analysis EPA did not attempt to account for facilities located in smaller suburban communities that may be near large urban areas.

**2.2.2 Climatic characteristics.** The Agency also does not agree with the mineral production industry that mineral processing operations are primarily located in the arid West. The Agency has ample evidence that many mineral processing operations are, in fact, located in areas of the country that are likely to receive significant rainfall. Mineral processing facilities are located in all regions of the U.S., as illustrated in Figure 1.

In particular, the Agency notes that a large number of facilities are located in the Northeast and Southeast, both of which receive a significant amount of rainfall. For example:

- 15 facilities are located in New York;

**Table 3:**

**Population Estimates Within One-Half, One, and Five Miles of Selected Mineral Processing Facilities  
(Latitude/Longitude Numbers from 1991 SWMPF Surveys)**

Facility	State	Longitude	Latitude	Sector	
					0.5 M
Acme - Riverdale	Illinois	87 degrees 37 minutes W	41 degrees 39 minutes N	Ferrous	3,400
Inland Steel - E. Chicago	Indiana	87 degrees 47 minutes W	41 degrees 40 minutes N	Ferrous	2,500
Armco Inc. - Ashland West Works	Kentucky	82 degrees 40 minutes W	38 degrees 30 minutes N	Ferrous	650
SCM - Baltimore	Maryland	76 degrees 32 minutes W	39 degrees 12 minutes N	TiCl <sub>4</sub> and TiO <sub>2</sub>	0
Bethlehem Steel - Sparrows Point	Maryland	76 degrees 28 minutes W	40 degrees 14 minutes N	Ferrous	0
ASARCO - East Helena	Montana	111 degrees 55 minutes W	46 degrees 35 minutes N	Lead	200
Molycorp - Washington	Pennsylvania	80 degrees 16 minutes W	40 degrees 10 minutes N	Molybdenum	3,200
Allegheny - Brackenridge	Pennsylvania	79 degrees 43 minutes W	40 degrees 37 minutes N	Ferrous	2,100

Bethlehem Steel - Bethlehem	Pennsylvania	75 degrees 20 minutes W	40 degrees 35 minutes N	Ferrous	3,500
ASARCO - Amarillo	Texas	101 degrees 43 minutes W	35 degrees 17 minutes N	Copper	1,000
ASARCO - Corpus Christi	Texas	97 degrees 27 minutes W	27 degrees 48 minutes N	Zinc	1,100
ASARCO - El Paso	Texas	106 degrees 31 minutes W	31 degrees 47 minutes N	Copper	1,200
Phelps Dodge	Texas	106 degrees 23 minutes W	31 degrees 45 minutes N	Copper	3,600

Population Data Source: Bureau of the Census, 1990

- 27 facilities are located in Pennsylvania;
- 16 facilities are located in Tennessee; and
- 18 facilities are located in Florida.

In addition, mineral processing operations in the West are not located exclusively in its arid portions. Based on data provided in Figure 1, it can be seen that a number of mineral processing facilities are located in regions typically characterized as receiving significant rainfall (e.g., the Pacific Northwest). Thus, due to the location of a significant number of mineral processing facilities in wetter parts of the country, it is likely that mineral processing wastes would be subject to the same wet/dry cycles that contribute to particle size reduction in landfills. Similarly, the location of these facilities in areas receiving a significant amount of rainfall suggests that the leaching potential of mineral processing waste is greater than that argued by the mineral processing industry in the *Edison* case.

AMC has argued that because mineral processing wastes are monofilled, they are not subject to cover requirements, and therefore will not break down due to the use of heavy machinery. As the Agency has demonstrated above, co-disposal of mineral processing and organic wastes does occur; mineral processing wastes in these cases will therefore be exposed to the same physical forces normally found at MSWLFs (e.g., from heavy machinery). When monolithic wastes break down, they will be as susceptible to leaching as any other waste. As previously discussed, the prevalence of mineral processing facilities in areas receiving substantial amounts of rain and susceptible to freeze-thaw cycles, coupled with the potential for the breakdown of monolithic wastes in MSWLFs, suggest that the particle size reduction requirement included in the TCLP is justified. Finally, the Agency rejects AMC's assertion that all mineral processing wastes

are monolithic. Substantial amounts of mineral processing wastes are not monolithic; indeed, many wastes have a small particle size.

2.2.3 Geologic characteristics. Finally, the Agency does not agree with representatives of the minerals industry that DAFs of 100 are unreasonably low given the geologic characteristics of some mineral processing facility locations. The Agency has extensive evidence that mineral processing facilities are located in or near sensitive environments. In many cases, the characteristics of these sensitive environments increase the likelihood that contaminants from mineral processing operations could quickly and easily migrate to groundwater and possibly to drinking water supplies. For example, contamination from facilities located in karst terrain could migrate in a largely unattenuated and undiluted fashion. Similarly, facilities located in or near wetland areas may have a greater likelihood of contaminating groundwater, given the role of wetlands as groundwater recharge areas. In its 1990 Report to Congress on Special Wastes from Mineral Processing, the Agency noted a significant number of cases in which mineral processing operations were located in these and other sensitive environments. The cases cited include the following:

- A sodium dichromate production facility located both in karst terrain and within one mile of a wetland area;
- Seven of ten primary copper production facilities located in sensitive environments that include karst terrain, wetlands, floodplains, and fault zones;
- One elemental phosphorus production plant located in karst terrain and a second located within one mile of a wetland;
- Two facilities involved in ferrous metals production located in karst terrain and several facilities located adjacent to or near wetlands, as well as fifteen facilities located in 100-year floodplains.
- Three hydrofluoric acid production plants located within one mile of a wetland, with two located in a 100-year floodplain and the third located in a fault zone;
- One primary lead processing facility located in karst terrain, a fault zone and near a wetland, and two others located near a wetland and one other located in a fault zone;
- Two phosphoric acid production plants located in karst terrain, eight plants located in 100-year floodplains, and 16 plants located in or within one mile of a wetland; and

- Three titanium tetrachloride production facilities located in 100-year floodplains and one located in a fault zone.

Given the location of a number of mineral processing waste sites, leachate from mineral processing waste units could easily migrate to groundwater and ultimately contaminate drinking water. In fact, the threat to groundwater has been a major factor at some NPL mine sites. At least 21 of the 52 NPL mine sites have tailings ponds that have released contaminants to ground water and surface water, contaminating domestic drinking water wells. Such contamination can threaten and has threatened a substantial number of people. For example, the entire population of the town of Mill Creek, Montana had to be relocated, the buildings demolished, and the area fenced in because of air, soil, and drinking water contamination. Some mining companies are installing lined tailings ponds; this is, however, the exception, not the rule. Thus, the Agency continues to believe that it is justified in applying DAFs of 100 to mineral processing wastes.

### *2.3 Use of the Synthetic Precipitation Leaching Procedure*

While the Agency agrees that further study of the Synthetic Precipitation Leaching Procedure (SPLP) may be warranted, the Agency does not agree, based on current evidence presented below, with AMC's contention that use of the SPLP (with its purportedly less aggressive leaching medium) will result in significant differences in the identification of the wastes that would be classified as hazardous.<sup>8</sup> Based on this evidence, coupled with the possibility of co-disposal of mineral processing wastes in MSWLFs, and the Agency's desire to simplify implementation of the TC through the use of a single leach test, the Agency believes that there is no strong reason to consider allowing the use of the SPLP as an alternative to the TCLP for analyzing mineral processing wastes.

The SPLP was originally designed as an alternative to the TCLP. Like the TCLP, the SPLP is designed to determine the mobility of both organic and inorganic contaminants contained in wastes. In contrast to the TCLP, however, the SPLP is not based on a mismanagement scenario that assumes that waste is co-disposed with MSW

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<sup>8</sup> In certain other contexts, the Agency has suggested that a less aggressive leaching test, such as the SPLP, could be applied to mineral processing wastes. In 54 FR 36601, (see section 1.3 above), for example, EPA suggested that use of the SPLP may be more appropriate for determining "whether a waste should be temporarily excluded from regulation under 3001(b)(3)." In this instance, however, EPA asserted that the "EP and TCLP tests and data are generally inappropriate for identifying mineral processing wastes which are 'clearly not low hazard'" only for the purpose of determining which mineral processing wastes would qualify for exclusion from Subtitle C. This statement only demonstrates EPA's belief that the SPLP may be a more effective test to *screen* wastes that are clearly not low hazard, not that the EP and TCLP are inappropriate to apply to non-exempt mineral processing wastes to determine if they are hazardous. For purposes of identifying which solid wastes are hazardous under sections 1004(5) and 3001(a) of RCRA, EPA continues to support the use of the TCLP.



in a landfill. Rather, the SPLP is intended to simulate the effect of acid rain on land-disposed wastes. The specific procedures for conducting the test are similar in many ways to the procedures employed for the TCLP (e.g., where solids are being tested, particle size must be reduced and a liquid extract obtained using a leaching medium). The key difference between the two tests is the composition of the leaching medium. While the TCLP relies on extraction fluids that simulate the organic acids that would form from decomposing wastes in a landfill, the SPLP requires the use of extraction fluids that simulate acid rain. The specific fluid used in the test is a function of the material being tested and the region of the country in which the waste is disposed.

Further research conducted by OSW to date, however, has failed to conclusively determine whether the SPLP and TCLP produce differing results of any statistical significance. EPA recently evaluated a series of tests to compare the leachate data from the Extraction Procedure (EP) and the SPLP. (A greater level of available data led to the use of the EP instead of the TCLP for this analysis. This should not affect the study's results however, given that the EP and TCLP are virtually identical). This analysis indicated that there was no statistically significant difference between the results obtained using the EP and SPLP for all TC metals. Of importance is the fact that both procedures were run on the same samples, thus avoiding the potential for error inherent in comparing tests run on different materials. A copy of the results of this statistical comparison can be found in Appendix E of this document. The Agency also analyzed SPLP and TCLP data submitted by one generator of electric arc furnace dust (KO61) in response to proposed land disposal restrictions. This second analysis produced findings at variance with EPA's earlier analysis of EP and SPLP data. (A copy of the data and a description of the analysis are included in Appendix F). It should be noted, however, that KO61 is not a primary mineral processing waste, and that while significant differences between the SPLP and TCLP results were found, in some cases, SPLP concentrations were higher than TCLP concentrations for the same sample material. Given the inconsistency of results in these two evaluations, the Agency does not feel justified in proposing to allow use of the SPLP as an alternative to the TCLP at this time.

### **3.0 Submittal of Industry Data**

The Agency feels further justified in its decision not to propose the SPLP as an alternative to the TCLP in light of the fact that industry has not submitted data that support the use of the SPLP in preference to the TCLP.

As discussed in Section 1 above, NMA and its predecessor organization, the American Mining Congress, have commented extensively in response to Agency proposals and in litigation on the use of the TCLP for determining the toxicity of mineral processing wastes. In those comments, NMA has advocated the use of various alternative tests, ultimately supporting use of a modified SPLP in comments submitted on the

Agency's 1992 proposal on the identification and listing of hazardous wastes.<sup>9</sup> NMA's comments on Agency proposals, as well as copies of arguments made in suits brought against the Agency are included as Appendix G of this document. Of particular note is the fact that the comments and arguments fail to include hard data that conclusively demonstrate either that the TCLP is inappropriate for use in determining the toxicity of mineral processing waste, or that an alternative test, such as the SPLP, would perform better with regard to these wastes.

Coupled with the Agency's own analysis described above, there appears to be little evidence at this time to support industry's suggestion that the Agency substitute use of the SPLP for the TCLP. As a consequence, the Agency continues to support the use of the TCLP for determining whether waste streams are hazardous by nature of toxicity characteristic.

#### **4.0 Summary of Findings**

According to the Court's ruling in the *Edison* case, the Agency is allowed to apply the TCLP to mineral processing wastes if it can be demonstrated that the mismanagement scenario assumed by EPA is plausible for these wastes. Further research (as shown above) has revealed that the possibility of such mismanagement exists. While it is true that some mineral processing wastes are disposed in monofills located at mineral processing facilities, mineral processing wastes are also generated in low volumes and have been (or potentially were) co-disposed with MSW in MSWLFs. Reports of co-disposal of manufactured gas plant wastes with MSW and data from the Agency's 1989 National Survey of Solid Wastes from Mineral Processing Facilities also provide support for EPA's presumption that its mismanagement scenario may plausibly be applied to mineral processing wastes.

In addition, other aspects of the mismanagement scenario, specifically, issues of location and climate, also appear applicable to mineral processing wastes. Contrary to statements made by representatives of the mineral processing industry, mineral processing wastes are found throughout the United States, in all geographic and climatic regions. This includes sites near population centers and in areas characterized by above-average rainfall -- both features that increase the risk of harmful environmental effects if these wastes are mis-managed. Mineral processing facilities also have been found in geologically unstable areas such as wetlands, floodplains, and karst terrain.

Finally, recent analyses comparing EP and SPLP test results suggest that use of the TCLP is unlikely to classify as hazardous mineral processing wastes that would be found non-hazardous using an alternative test such as the SPLP. In addition, industry has

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<sup>9</sup> Comments of the American Mining Congress, July 24, 1992, p. 107.

submitted no data to conclusively demonstrate that the SPLP would more accurately identify mineral processing wastes as hazardous by toxicity characteristic. This provides further evidence still that EPA is justified in applying the TCLP to mineral processing wastes.

## **APPENDIX A**

### **Likely Cases of Co-disposal**

Appendix A provides more detailed accounts of cases in which co-disposal of mineral processing wastes and MSW have clearly occurred. These examples provide strong evidence in support of EPA's contention that the mismanagement scenario underlying the TCLP is appropriate for application to mineral processing wastes, and that the TCLP should therefore be applied to mineral processing wastes. Such cases are as follows:

- C     Brown Metallurgical Lab; Phoenix, AZ
- C     A&W Smelters; Mojave, CA
- C     Interstate Lead Company; Leeds, AL
- C     Osborne Landfill; Grove City, PA

## **APPENDIX B**

### **Possible Cases of Co-disposal**

Appendix B contains instances where co-disposal may have occurred. Imprecise definitions of words such as "slag," "dusts," and "ash" (along with the tendency for such wastes to easily mix with MSW soil and debris) make it difficult to determine whether co-disposal actually occurred in these cases. While the evidence provided by these cases may not be conclusive, EPA believes that the information included here should be considered in conjunction with other evidence when assessing the plausibility of applying the TCLP's mismanagement scenario to mineral processing wastes. A list of these cases is as follows:

- C Trona, Argus and Westend Searles Dry Lake Piles; Trona, CA
- C Asarco; Corpus Christi, TX
- C Centralia Municipal Landfill; Centralia, WA
- C Nedlog Technology Group; Laramie, WY
- C Alcan Aluminum Limited; Montreal, PQ, Canada
- C Newly patented disposal process; Washington, DC
- C Freeway Sanitary Landfill; Burnsville, MN
- C J&L Landfill; Rochester Hills, MI
- C Dixie Cavers Country Landfill; Roanoke County, VA
- C Ohio River Park; Neville Island, PA
- C Feed Materials Production Center; Hamilton, OH
- C Janesville Ash Beds; Janesville, WI

## **APPENDIX C**

### **Potential Cases of Co-disposal**

Appendix C describes cases in which the potential exists for co-disposal of mineral processing wastes and MSW. Such cases include sites where mineral processing wastes and MSW were disposed near each other and sites where landfills were developed on land previously devoted to mining activities. While these cases do not provide clear-cut evidence of co-disposal, they add weight to the argument that co-disposal may plausibly occur. These cases are as follows:

- C Lemberger Landfill; Whitelaw, WI
- C Buckeye Reclamation; St. Clairsville, OH
- C Indian Bend Wash Area; Maricopa County, AZ
- C Jackson Township Landfill; Ocean, NJ
- C Big River Mine Tailings/St. Joe Minerals Corp.; Desloge, MO
- C Aerojet General Corp.; Rancho Cordova, CA
- C Heleva Landfill; North Whitehall Twp, PA
- C Monsanto Chemical Co., Soda Springs Plant; Soda Springs, ID
- C U.S. Army - Fort Wainwright; Fort Wainwright, AK

## **APPENDIX D**

### **Cases of Disposal of Manufactured Gas Plant Wastes**

Appendix D provides case studies of manufactured gas plant waste management practices. The appendix also includes a listing of NPL sites containing such wastes and landfills that accepted coal tar waste. In addition, Appendix D provides a state-by-state breakdown of manufactured gas plants listed on CERCLIS. These cases involve the following facilities:

- C Broadhead Creek; Stroudsburg, PA
- C Central Illinois Public Service Co.; Taylorville, IL
- C Coal Gasification Plant; Commencement Bay, WA
- C Dover Gas Light Co.; Dover, DE
- C Fairfield Coal Gasification Plant; Fairfield, IA
- C Peoples Natural Gas Co.; Dubuque, IA
- C Pine Street Canal; Maltex Pond, VT
- C Suffern Village Well Field; Suffern Village, NY
- C Utah Power & Light/American Barrel Co.; Utah
- C Waterloo Coal Gasification Plant; Waterloo, IA
- C New Lyme Landfill; New Lyme, OH
- C E.H. Schilling Landfill; Ironton, OH
- C Millcreek Dump; Erie, PA
- C Welsh Landfill; Honeybrook, PA

## **APPENDIX E**

### **Statistical Comparison of EP Leachate and SPLP Leachate Data Obtained from Analysis of Mineral Processing Wastes**



## **APPENDIX F**

### **Statistical Comparison of TCLP Leachate and SPLP Leachate Data Obtained from Analysis of KO61 Data**

## APPENDIX G

### **National Mining Congress: Comments, Briefs, and Related Documents Pertaining to the Toxicity Characteristic**

Appendix G contains a comprehensive list of the comments pertaining to the Toxicity Characteristic submitted by the National Mining Association.

- C November 24, 1978 Comments of the American Mining Congress (excerpt);
- C March 17, 1986 Comments of the American Mining Congress;
- C August 12, 1986 Comments of the American Mining Congress;
- C August 6, 1987 Comments of the American Mining Congress;
- C July 24, 1992 Comments of the American Mining Congress (excerpt);
- C Joint Initial Brief of Consolidated Industry Petitioners, Edison Electric Institute, et al. v. U.S. Environmental Protection Agency, No. 89-1320 et al. (D.C. Cir. Dec 23, 1991) (excerpt);
- C Joint Reply Brief of Consolidated Industry Petitioners, Edison Electric Institute, et al. v. U.S. Environmental Protection Agency, No. 89-1320 et al. (D.C. Cir. Dec 23, 1991) (excerpt);
- C 54 FR 36,592, 36,600-604 (September 1, 1989) (final Bevill reinterpretation rule for mineral processing wastes); and
- C 57 FR 21,450, 21,483 (May 20, 1992) (proposed Hazardous Waste Identification Rule).